

# UNIVERSITY OF BIRMINGHAM

## Research at Birmingham

### Parameters and boundary conditions in modelling the track deterioration in a railway system

Oliveira De Melo, Andre; Kaewunruen, Sakdirat; Papaelias, Mayorkinos

*License:*

Creative Commons: Attribution (CC BY)

*Document Version*

Peer reviewed version

*Citation for published version (Harvard):*

Oliveira De Melo, A, Kaewunruen, S & Papaelias, M 2019, Parameters and boundary conditions in modelling the track deterioration in a railway system. in The 4th World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium. IOP Publishing Ltd., The 4th World Multidisciplinary Civil Engineering-Architecture-Urban Planning Symposium, Prague, Czech Republic, 17/06/19.

[Link to publication on Research at Birmingham portal](#)

**Publisher Rights Statement:**

Checked for eligibility: 21/06/2019

**General rights**

Unless a licence is specified above, all rights (including copyright and moral rights) in this document are retained by the authors and/or the copyright holders. The express permission of the copyright holder must be obtained for any use of this material other than for purposes permitted by law.

- Users may freely distribute the URL that is used to identify this publication.
- Users may download and/or print one copy of the publication from the University of Birmingham research portal for the purpose of private study or non-commercial research.
- User may use extracts from the document in line with the concept of 'fair dealing' under the Copyright, Designs and Patents Act 1988 (?)
- Users may not further distribute the material nor use it for the purposes of commercial gain.

Where a licence is displayed above, please note the terms and conditions of the licence govern your use of this document.

When citing, please reference the published version.

**Take down policy**

While the University of Birmingham exercises care and attention in making items available there are rare occasions when an item has been uploaded in error or has been deemed to be commercially or otherwise sensitive.

If you believe that this is the case for this document, please contact [UBIRA@lists.bham.ac.uk](mailto:UBIRA@lists.bham.ac.uk) providing details and we will remove access to the work immediately and investigate.

# **PARAMETERS AND BOUNDARY CONDITIONS IN MODELLING THE TRACK DETERIORATION IN A RAILWAY SYSTEM**

Andre L. O. de Melo<sup>1,3</sup>, Sakdirat Kaewunruen<sup>1,3</sup>, and Mayorkinos Papaelias<sup>2,3</sup>

<sup>1</sup> Department of Civil Engineering, School of Engineering, University of Birmingham, Birmingham B15 2TT, United Kingdom

<sup>2</sup> School of Metallurgy and Materials, University of Birmingham, Birmingham B15 2TT, United Kingdom

<sup>3</sup> Birmingham Centre for Railway Research and Education, School of Engineering, University of Birmingham, Birmingham B15 2TT, United Kingdom

## **ABSTRACT**

The main function of the railway track is to support the loads of the railway vehicles and to guide their movements. To investigate the effect of a specific load on the track, the evaluation of the different function of the elements is necessary. Each track component has its own mechanical parameters, which in most case cannot be restored without parts replacements. The development of the track structure has some component properties more important than others. With Finite Element Model (FEM) software packages available, the use of them for simulation and analysis of track components has become an accurate tool when supported by a hybrid approach. In FEM, special attention needs to be given to the boundary conditions and linear or nonlinear interactions between track components. The aim of this paper is to present, in applying to model the track deterioration in a railway system, the mapping of both parameters and boundary conditions, their descriptions, properties, interfaces and how these occur in a railway track in-service.

Corresponding Author: Andre L. O. de Melo